

DETAILED ACTION

Drawings

1 The drawings are objected to because figures 4 and 5 shading makes the drawing illegible. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

2 The attempt to incorporate subject matter into this application by reference to US 5,621,667 is ineffective because a proper incorporation by reference where the perfecting words "incorporated by reference" or the root of the words "incorporate" (e.g., incorporating, incorporated) and "reference" (e.g., referencing) fails to appear.

The disclosure is objected to because of the following informalities:

Page 16, line 17 recites, in part, "...L1 of less the 1..." is unclear;

Examiner suggests "...L1 of less [the] than 1..."

Page 18, line 1 recites, in part, "...anthropometric date..." is unclear;

Examiner suggests "...anthropometric [date] data..."

Correction is required.

Claim Objections

- 3 Claim 23 is objected to because of the following informalities: Claim 23, line 1 recites, in part, "...display screen is a touch used..." which is unclear; Examiner suggests "...display screen is a [touch] touchscreen used..."
Correction is required.

Claim Rejections - 35 USC § 102

- 4 The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

Claims 1-16, 20, 21, 25, 27, 28 and 32-35 are rejected under 35 U.S.C. 102(e) as being anticipated by Kramer et al. (US 7,070,571) (Hereafter referred to as Kramer).

Kramer teaches:

Regarding claim 1, a plurality of sensor elements mounted to movable body segments of a subject (Sensors are provided, where the sensor may extend past a plurality of joints or the sensor may extend over a single joint, with the assembly comprising a plurality of the single sensor joints; column 8, lines 29-32), said sensor elements capable of sensing parameters associated with individual movement of the body segments (Sensors assemblies marked with a "(3)" after the name (not to be confused with a drawing reference numeral) measure a full three rotational degrees of freedom. Sensors marked with a "(1)" or a "(2)" are located on joints with less than complete rotational freedom, and are therefore simpler devices; column 12, lines 20-25);

Regarding claim 1, at least one control device for receiving said sensing parameters from said sensor elements and combining said sensing parameters to determine overall motion of said movable body segments (a Data Acquisition System (503) to process and transmit sensor data to a host computer, including a processor (or microprocessor) input/output port(s), memory, and other conventional computer elements; column 12, lines 63-67; figure 5);

Regarding claim 1, an analysis means for analysing said overall motion of said movable body segments (a body-sensing and feedback suit finds utility in sports analysis, virtual reality, motion capture, biomechanics, and the like; column 26, lines 32-34) to determine whether said overall motion of said movable body segments is within acceptable limits (monitor may also warn the wearer if an acceptable joint ranges were being exceeded, for instance using a tone or buzz; column 27, lines 8-10);

Regarding claim 2, the analysis means is a software program that is stored on said control device (The WPA is a belt-mounted pack that contains all the instrumentation electronics for data collection and logging. VirtualBody software contains utilities for user calibration, graphical body model, and real-time data acquisition via the WPA; column 4, lines 12-16);

Regarding claim 3, the analysis means also monitors accumulated load and provides an alarm if accumulated load exceeds an acceptable limit (monitor may also warn the wearer if an acceptable joint ranges were being exceeded, for instance using a tone or buzz; column 27, lines 8-10);

Regarding claim 4, the analysis means compares parameters associated with said overall motion with parameters associated with a motion within safe and accepted limits and indicates whether the overall motion of the subject is within said safe and accepted limits (To map each individual sensor signal optimally into the range of the analog-to-digital converter (ADC), each sensor has an associated offset and gain value stored in EEPROM; column 9, lines 44-47);

Regarding claim 5, a remote computing device wherein the analysis means is a software program stored on said remote computing device (the WPA is a belt- or desk-mounted device containing the Data Acquisition System (DAS) and various other power-supply and communications functions; column 8, lines 43-46);

Regarding claim 6, a control device embedded in each said sensor element (sensors held in the LEA and UEA garments (502), plus a Data Acquisition System (503) to process and transmit sensor data to a host computer, including a processor (or microprocessor) input/output port(s), memory, and other conventional computer elements; column 12, lines 62-67; figure 5);

Regarding claim 7, a remote computing device programmed to compare parameters associated with the overall motion with parameters associated with a motion within safe and accepted limits (the WPA is a belt- or desk-mounted device containing the Data Acquisition System (DAS) and various other power-supply and communications functions; column 8, lines 43-46);

Regarding claim 8, a portable computing device programmed to compare parameters associated with the overall motion with parameters associated with a motion within safe and accepted limits (the WPA is a belt- or desk-mounted device containing the Data Acquisition System (DAS) and various other power-supply and communications functions; column 8, lines 43-46);

Regarding claim 9, the control device is a central control device in the form of a portable computing device which centrally receives said sensing parameters from the sensing elements and combines the sensing parameters to determine overall motion of said movable body segments (the WPA is a belt- or desk-mounted device containing the Data Acquisition System (DAS) and various other power-supply and communications functions; column 8, lines 43-46);

Regarding claim 10, the analysis means is software programmed in the portable computing device (The WPA is a belt-mounted pack that contains all the instrumentation electronics for data collection and logging. VirtualBody software contains utilities for user calibration, graphical body model, and real-time data acquisition via the WPA; column 4, lines 12-16);

Regarding claim 11, the analysis means is a remote computing device programmed to compare parameters associated with the overall motion with parameters associated with a motion within safe and accepted limits (the WPA is a belt- or desk-mounted device containing the Data Acquisition System (DAS) and various other power-supply and communications functions; column 8, lines 43-46);

Regarding claim 12, a transmitter means associated with each said sensor element (Typical goniometers include resistive bend sensors, Hall-effect sensors, optical encoders, potentiometers, resolvers, and the like. Since the cable is flexible, it is comfortable and can bend around joints which are not intended to affect the rotation of the cable, while still measuring the rotation of a body part due to the axial transmission of the rotation via the cable; column 24, lines 28-34);

Regarding claim 13, a remote computing device, the at least one control device and the analysis means are programmed in said remote computing device and each sensor transmits said sensing parameters to the remote computing device for determination of the overall motion and analysis of the motion (Other sensing and feedback elements associated with the apparatus 5618 include a force/pressure-sensing platform 5605, a data-logging communication module and local computer 5616, a body-position and orientation sensor 5617 (e.g., inertial or electromagnetic, optical or ultrasonic), EKG sensor 5602, microphone 5606, respiration sensor 5607, earphone 5608, EEG sensor 5609 attached to headband 5610 or to hood 5611 of suit, EOG sensor 5612, eye tracker and/or facial expression monitor 5613 and force/pressure/contact sensors 5603 on hands; column 26, lines 26-30);

Regarding claim 14, a central control device worn on the subject and wherein the analysis means is software programmed in the central control device (The WPA is a belt-mounted pack that contains all the instrumentation electronics for data collection and logging. VirtualBody software contains utilities for user calibration, graphical body model, and real-time data acquisition via the WPA; column 4, lines 12-16);

Regarding claim 15, a remote computing device remote from the subject wherein the analysis means is software programmed in the remote computing device (the WPA is a belt- or desk-mounted device containing the Data Acquisition System (DAS) and various other power-supply and communications functions; column 8, lines 43-46);

Regarding claim 16, the sensor element includes a data memory and microprocessor for storing and processing said sensed parameters (sensors held in the LEA and UEA garments (502), plus a Data Acquisition System (503) to process and transmit sensor data to a host computer, including a processor (or microprocessor) input/output port(s), memory, and other conventional computer elements; column 12, lines 62-67; figure 5);

Regarding claim 20, each sensor element includes one or more signal conditioning means (Each sensor provides two piezoresistive elements for the bridge; the other half of the bridge consists of two high-precision reference resistors; column 9, lines 26-28);

Regarding claim 21, each sensor element includes one or more external sensor inputs (figure 5);

Regarding claim 25, an interface unit that facilitates bi-directional communication between said one or more control devices and said plurality of sensor elements (the LEA and UEA garments (502), plus a Data Acquisition System (503) to process and transmit sensor data to a host computer, including a processor (or microprocessor) input/output port(s), memory, and other conventional computer elements; column 12, lines 63-67);

Regarding claim 27, the control device includes a remote control facility that enables an operator to interact with the system remotely without the need for physically operating the control device (the WPA is a belt- or desk-mounted device containing the Data Acquisition System (DAS) and various other power-supply and communications functions; column 8, lines 43-46);

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Regarding claim 28, sensing parameters associated with individual movement of one or more body segments (Sensors assemblies marked with a "(3)" after the name (not to be confused with a drawing reference numeral) measure a full three rotational degrees of freedom. Sensors marked with a "(1)" or a "(2)" are located on joints with less than complete rotational freedom, and are therefore simpler devices; column 12, lines 20-25);

Regarding claim 28, combining said sensing parameters to determine overall motion of said body segments (a Data Acquisition System (503) to process and transmit sensor data to a host computer, including a processor (or microprocessor) input/output port(s), memory, and other conventional computer elements; column 12, lines 63-67; figure 5);

Regarding claim 28, analysing said overall motion to determine if said motion is within acceptable limits (a body-sensing and feedback suit finds utility in sports analysis, virtual reality, motion capture, biomechanics, and the like; column 26, lines 32-34)

Regarding claim 28, indicating whether said overall motion is within said acceptable limits (monitor may also warn the wearer if an acceptable joint ranges were being exceeded, for instance using a tone or buzz; column 27, lines 8-10);

Regarding claim 32, measuring pressure as a resistance measurement from pressure sensors associated with at least one of said one or more body segments (Other sensing and feedback elements associated with the apparatus 5618 include a **force/pressure-sensing platform** 5605, a data-logging communication module and local computer 5616, a body-position and orientation sensor 5617 (e.g., inertial or electromagnetic, optical or ultrasonic), EKG sensor 5602, microphone 5606, respiration sensor 5607, earphone 5608, EEG sensor 5609 attached to headband 5610 or to hood 5611 of suit, EOG sensor 5612, eye tracker and/or facial expression monitor 5613 and force/pressure/contact sensors 5603 on hands; column 26, lines 26-30);

Regarding claim 33, measuring strain via strain gauges associated with at least one of said one or more body segments (Other sensing and feedback elements associated with the apparatus 5618 include a force/pressure-sensing platform 5605, a data-logging communication module and local computer 5616, a body-position and orientation sensor 5617 (e.g., inertial or electromagnetic, optical or ultrasonic), EKG sensor 5602, microphone 5606, respiration sensor 5607, earphone 5608, EEG sensor 5609 attached to headband 5610 or to hood 5611 of suit, EOG sensor 5612, eye tracker and/or facial expression monitor 5613 and **force/pressure/contact sensors** 5603 on hands; column 26, lines 26-30);

Regarding claim 34, measuring one or more other parameters from devices including heart rate monitors, other physiological measurement devices, instrumented shoes and fixed force plates (Other sensing and feedback elements associated with the apparatus 5618 include a force/pressure-sensing platform 5605, a data-logging communication module and local computer 5616, a body-position and orientation sensor 5617 (e.g., inertial or electromagnetic, optical or ultrasonic), **EKG sensor** 5602, microphone 5606, respiration sensor 5607, earphone 5608, EEG sensor 5609 attached to headband 5610 or to hood 5611 of suit, EOG sensor 5612, eye tracker and/or facial expression monitor 5613 and force/pressure/contact sensors 5603 on hands; column 26, lines 26-30);

Regarding claim 35, the analysis means monitoring accumulated load and providing an alarm if accumulated load exceeds an acceptable limit (monitor may also warn the wearer if an acceptable joint ranges were being exceeded, for instance using a tone or buzz; column 27, lines 8-10);

And regarding claim 35, to determine whether said overall motion of said movable body segments is within acceptable limits (To map each individual sensor signal optimally into the range of the analog-to-digital converter (ADC), each sensor has an associated offset and gain value stored in EEPROM; column 9, lines 44-47).

Allowable Subject Matter

5 Claims 17-19, 22, 24, 26, 29, 30 and 31 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim 23 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten to overcome objection cited above and in independent form including all of the limitations of the base claim and any intervening claims.

The following is an examiner's statement of reasons for allowance:

Claim 17 recites, in part, "each sensor element includes at least one gyroscope and at least one accelerometer for measuring angular velocity of the movable body segment in at least one or more planes of motion and for measuring acceleration components". This feature **in combination with the remaining claimed structure** avoids the prior art of record.

Claim 18 recites, in part, "each sensor element includes a magnetometer". This feature **in combination with the remaining claimed structure** avoids the prior art of record.

Claim 19 recites, in part, "each sensor element includes at least one gyroscope, at least one accelerometer and at least one magnetometer and measures absolute motion and position in three dimensions". This feature **in combination with the remaining claimed structure** avoids the prior art of record.

Claim 22 recites, in part, "each control device has a display screen". This feature **in combination with the remaining claimed structure** avoids the prior art of record.

Claim 23 recites, in part, "the display screen is a touch(sic screen) used by an operator for analysis and display of motion data obtained by the system". This feature **in combination with the remaining claimed structure** avoids the prior art of record.

Claim 24 recites, in part, "control device includes a memory card slot". This feature **in combination with the remaining claimed structure** avoids the prior art of record.

Claim 26 recites, in part, "interface unit includes a remote control interface". This feature **in combination with the remaining claimed structure** avoids the prior art of record.

Claim 29 recites, in part, "recording said overall motion for later analysis". This feature **in combination with the remaining claimed structure** avoids the prior art of record.

Claim 30 recites, in part, "parameters include one or more of angular velocities in the sagittal, coronal and transverse planes of m said body segments and linear acceleration experienced in three dimensions in relation to said body segments". This feature **in combination with the remaining claimed structure** avoids the prior art of record.

Claim 31 recites, in part, "parameters include one or more of sagittal, coronal and relative transverse angles of said body segments". This feature **in combination with the remaining claimed structure** avoids the prior art of record.

It is these limitations, which are not found, taught or suggested in the prior art of record, and are recited in the claimed combination that makes these claims allowable over the prior art.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

6 Any inquiry concerning this communication or earlier communications from the examiner should be directed to Douglas N. Washburn whose telephone number is (571) 272-2284. The examiner can normally be reached on Monday through Thursday 6:30 AM - 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John E. Barlow can be reached on (571) 272-2269.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR.

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Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

DNW

/John E Barlow Jr./

Supervisory Patent Examiner, Art
Unit 2863